Texas Highways

October 1957 35c

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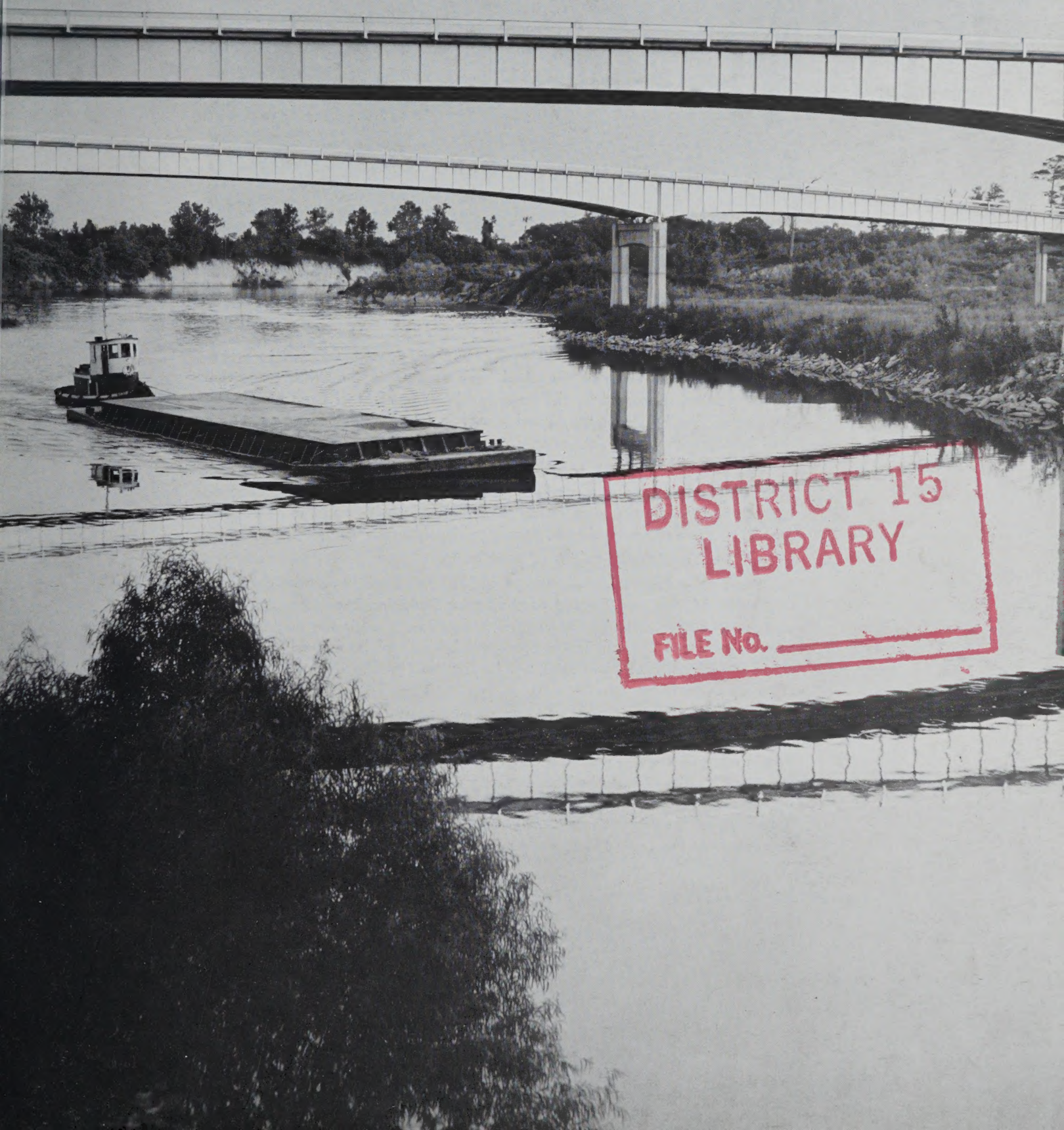

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FILE No.

Sixty-ninth Street Bridges

When the Buffalo Bayou twin bridges on U.S. 90-A were selected to grace this month's cover, we knew they had been entered in the "Most Beautiful Bridge" contest sponsored by the American Institute of Steel Construction. In the interim, the bridges were named winner in Class II of the competion of steel bridges constructed last year.

Purpose of the contest is to encourage appreciation of the beauty that can be achieved in the design of steel bridges. Contest entries are classed according to size, cost, and operating conditions. A jury of award, made up of leading architects, consulting engineers, engineering educators, and art museum curators, judge them on appearance only.

Completed in July 1956 at a total cost of $722,000, the bridges were designed by Charles Matlock and Farland Bundy, Senior Designing Engineers, under the supervision of E. A. Jelinek, Engineer of Bridge Design, all in the Highway Department's Bridge Division. The prize-winning bridges will be marked with stainless steel plaques and certificates will be awarded to the designers and the Highway Department.

This is the third winner entered in the contest by the Texas Highway Department. The Robert Street pedestrian overpass over the South Freeway in Fort Worth was the Class III winner in 1953, and the Neches River Bridge on U. S. 90 at Beaumont was named winner of Class II in 1952. Two structures designed by the Department also have won honorable mention—the Morningside Drive underpass on the North-South Freeway in Fort Worth and the Gulf Freeway overpass over the G.H. & S.A. Railroad and Griggs Road in Houston.

Texas Highways

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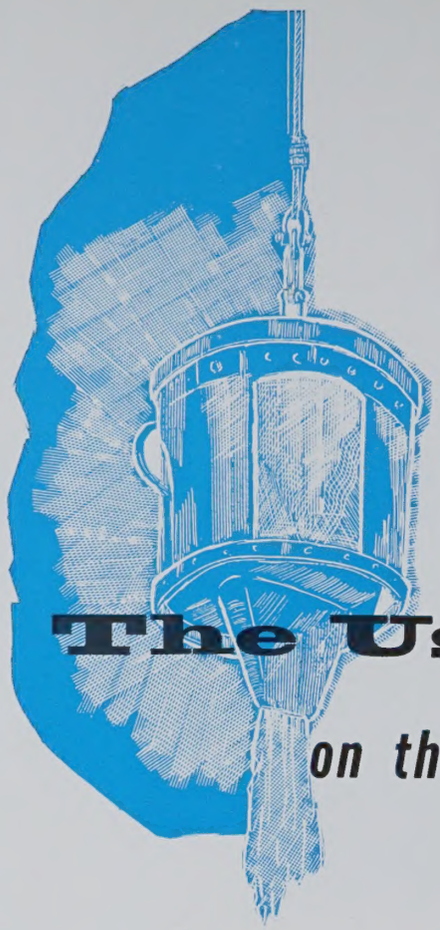


The Use of Lightweight

on the Pecos River Bridge

G. P. Brown, Senior Resident Engineer
and
Victor D. Bolner, Senior Inspector
District 22

This Pecos River Bridge is located on U. S. Highway 90, in Val Verde County, 43 miles northwest of Del Rio. Lightweight concrete was provided for slabs on the 1,040-foot continuous deck truss across the Pecos Canyon, with spans of 312-416-312 feet. There were 723 cubic yards of Class X concrete (lightweight) required for this slab. An estimated 43,000 pounds in dead weight was saved by the use of lightweight concrete. The slabs were 26 feet in length (same as panel length of truss) and were poured according to the pouring sequence shown on the plans.

We had no previous experience in lightweight concrete and the only information we could find was in papers prepared by individuals who had some experience. With the little information we had, we rented a five-cubic-foot mixer and a supply of lightweight coarse and fine aggregate furnished by Featherlite of San Antonio, and started making trial batches. We made 22 trial batches

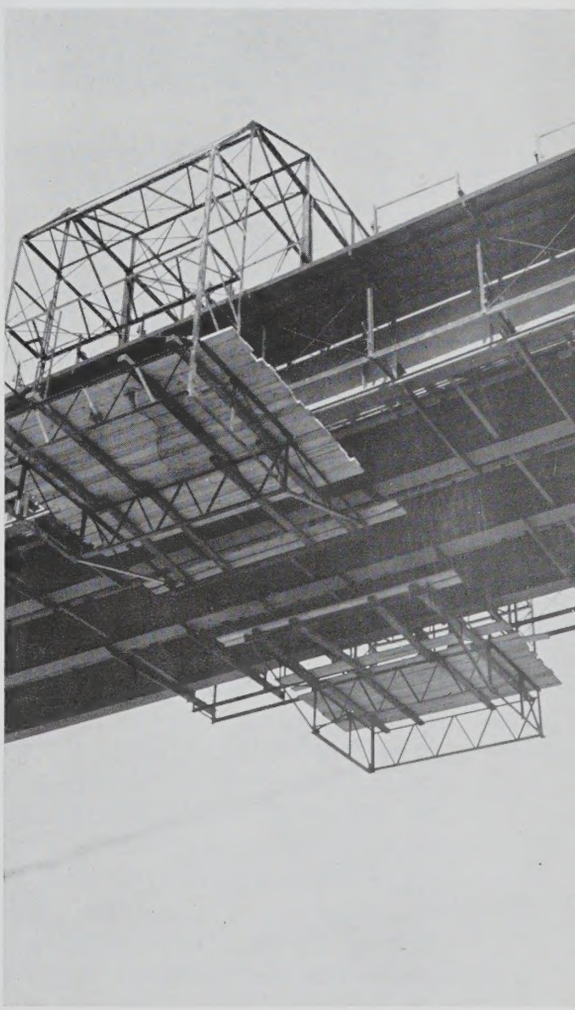
The overhead traveler for the erection and removal of forms traveled on railroad rails. Removable steel forms were used for the overhang.

Concrete

Volumes have been printed about the Pecos River Bridge. In the world of bridges, it has undeniable glamour, and a talent for getting its name in the paper. TEXAS HIGHWAYS has carried stories on its violent destruction by flood, on the low-water replacement, and on the use of the hydraulic jack principle of raising slipforms on the construction project. This newest story concerns the use of lightweight concrete in contructing the bridge.

varying from 60 per cent coarse aggregate and 40 per cent fine aggregate to 40 per cent coarse aggregate and 60 per cent fine aggregate, air entrainment from 0 per cent to 12 per cent, and slumps from one-half inch to five inches. The seven-day beam breaks varied from 348 to 631. Twelve cylinders were made of what appeared to be the best designs, and they varied from 3,350 to 4,615 with Youngs Modulus from 1.20×10^6 to 1.42×10^6. The design selected as best contained 42 per cent coarse aggregate, 58 per cent fine aggregate, 8 per cent air entrainment, and two-inch slump. The seven-day beams for this design averaged 552 and cylinders, 3,417. All concrete for Class X contained six sacks of cement per cubic yard.

The aggregate used was expanded clay shale furnished by the Featherlite Company of San Antonio. Samples were forwarded to the laboratory in Austin for testing. The fine aggregate met specifications and indicated the average compressive strength to be 3,992, while Ottowa was 2,487. The coarse aggregate also met specifications and the Los Angeles Abrasion—Test B—32.4 per cent. There was considerable variation in the gradation of the aggregate furnished by Featherlite, which required numerous changes in batch design to secure proper workability. R. W. Shafer, Senior Concrete Engineer, and Carmon Grant, Senior Engineering Assistant, from the Materials and Tests Division in Austin, were on the job site just prior to beginning lightweight concrete work to assist in preparing trial batches. There were two batches prepared. The first batch consisted of 40 per cent coarse aggregate, 48 per cent lightweight fine aggregate, 12 per cent normal concrete sand; 8 per cent air entrainment. The second batch consisted of 30 per cent coarse aggregate, 70 per cent fine aggregate, and 8 per cent air. The slump of Batch 1 was one and five-eighths inch and Batch 2 was four inches. There were six cylinders and ten beams made for each batch with the following results: Number 1,



The overhead traveler provided a working platform underneath.

The traveler was designed so the platform could be swung out to clear verticals on the truss.

beams averaged 523 and cylinders 4,031 with Modulus 1.49×10^6; Number 2, beams averaged 460 and cylinders 3,226 with Modulus 1.26×10^6. It was apparent from these trial batches that normal sand was required for strength and workability.

On January 30, 1957, we started pouring the lightweight concrete slabs. There were forty 26-foot slabs on the truss section with approximately 18.1 cubic yards per slab. The contractor poured one slab per day in the sequence indicated on the plans. The three-sack mixer was located at the end of the structure and the concrete was transported in motorized concrete buggies.

The contractor elected to use light corrugated metal (Corro-form) for forming the slab between the top chords, and removable metal forms for the overhang on the outside of the top chords and curb. An overhead traveler mounted on railroad rails was provided to furnish a working platform for the erection and removal of the slab forms. This traveler was designed so that the platforms could be swung out to clear verticals on the truss. See Illustrations 1, 2, and 3.

We started pouring using 35 per cent coarse aggregate and 65 per cent fine aggregate, and no native sand. The mixture was very harsh and hard to work; so after the first two slabs blow sand obtained from the bed of the Pecos River was used. The amount of this blow sand varied according to the workability, strength of beams, and unit weights. It is our opinion that native sand should be specified in all of the lightweight concrete, and the finer the better.

We tried wetting the stockpiles of aggregate but gave it up as water evaporated about as fast as we put it in, and after about the third slab we used the materials dry. We kept the materials in the mixer from three to five minutes. Some fine aggregate was lost due to the high winds, but not enough to make any difference. By not pre-wetting the aggregates we found that we had more control of the slump.

The use of air entrainment should also be a requirement. It is our opinion that the air should not be less than 5 per cent or more than 8 per cent. Less than 5 per cent air makes the mixture hard to work and more than 8 per cent probably will reduce the strength.

SUMMARY AND RESULTS OF BATCH DESIGNS

Pour No.	*Design No.*	*Slump*	*% C.A.*	*% F.A.*	*% Sand*	*Beam Average*	*Cylinder Average*		*Weight Per Cu. Ft.*	
						7 Day	*Stress*	*Modulus*	*Wet*	*14 Day Air Dry*
1	1	3″	35	65	0	535	4168	1.33×10^6		84.2
2	1	2″	35	65	0	508	4175	1.39×10^6		90.6
3	2	2″	36	43	21	526	4933	1.51×10^6	97.1	89.8
4	3	2½″	36	44.5	19.5	549	4381	1.48×10^6	97.8	90.4
5	4	2½″	36.5	44	19.5	576			96.8	84.6
6	5	2½″	34	66	0	556				89.0
7	6	3″	40	48	12	587			95.5	92.2
8	6	3″	40	48	12	587			95.4	92.0
9	6	3″	40	48	12	601				89.4
10	6	3½″	40	48	12	538			97.3	87.1
11	6	2½″	40	48	12	544	4508	1.33×10^6		86.4
12	6	3″	40	48	12	568			97.4	85.3
13	6	2½″	40	48	12	588				84.2
14	6	2½″	40	48	12	582				80.5
15	7	2½″	30	60	10	615			94.9	86.0
16	8A	3″	30	55.5	14.5	586			96.1	86.4
17	8A	2½″	30	55.5	14.5	632			95.2	85.9
18	8A	2″	30	55.5	14.5	568	4334	1.38×10^6	95.4	82.6
19	8A	2″	30	55.5	14.5	590				86.1
20	8A	3″	30	55.5	14.5	560				86.1
21	8A	3″	30	55.5	14.5	555			91.2	86.3
22	8A	2″	30	55.5	14.5	563				86.1
23	8A	2½″	30	55.5	14.5	486				87.4
24	8A	2″	30	55.5	14.5	519	3803	1.33×10^6	94.6	87.3
25	8A	2″	30	55.5	14.5	569				84.5
26	8A	2″	30	55.5	14.5	575			93.0	84.1
27	8A	2½″	30	55.5	14.5	539				84.2
28	8A	3″	30	55.5	14.5	527	3387	1.24×10^6		83.3
29	8A	2½″	30	55.5	14.5	535				83.8
30	8A	2½″	30	55.5	14.5	525			90.0	87.0
31	8B	2″	25	57	18	455			92.0	87.4
32	8B	2″	25	57	18	602	4510	1.47×10^6	95.0	80.6
33	8B	2½″	25	57	18	535				84.1
34	8B	2½″	25	57	18	577				80.3
35	8B	2½″	25	57	18	552	4265	1.33×10^6	92.4	85.8
36	8B	2½″	25	57	18	545				87.4
37	8B	2½″	25	57	18	547				88.3
38	9	3″	35	45	20	578			91.3	88.7
39	9	3″	35	45	20	533				86.5
40	9	3″	35	45	20	533				87.5
Note: 8% Air Entrainment for all batches-Protex				Average		556	4246	1.39×10^6	94.6	86.2

The specifications for Class X concrete (lightweight) required a minimum modulus of elasticity of 1,350,000 pounds per square inch. We had some cylinders that fell below this requirement. We are unable to determine just what factors govern this requirement. It is our opinion that the use of native sand has a direct bearing on the modulus of elasticity, the greater the amount of native sand, the higher modulus of elasticity.

Finishing lightweight concrete is more difficult than normal concrete as the light aggregate tends to float to the top. The contractor used a tool composed of a heavy metal plate with numerous small holes of about one inch in diameter with handles. This tool was dropped and raised on the concrete just before the belting operation, which forced the large aggregate down and worked paste up. A fairly presentable finish was obtained. Lightweight concrete in the curbs finished nicely by using a rubbing stone.

The summary and results of all the pours is contained in the table.

The header bank is neatly finished.

Local sand and cement are mixed in a pugmill.

Cement Stabilized Riprap

Gilbert Bass, Senior Maintenance Foreman
District 10

THESE pictures show the method used in riprapping header banks at Bull Hide Slough Bridge on F. M. 2087 in Gregg County—a relief bridge on a low-water crossing of the Sabine River. The spring's flood washed away the header banks and aproach fill at each end of the bridge and scoured a hole almost to the bottom of the piling beneath the bridge.

After the fill was replaced and the scour filled with clay, the header banks were finished neatly to grade. Local sand was mixed in a pugmill with 10 per cent cement and a little water. This was placed in burlap bags, loaded into the skip of a front-end loader for hauling, and carefully placed on slope. It was then tramped to compact mix, and sacks were set in place. We ended up with a neat looking, well protected header bank.

This method of riprapping is in general use in our district where stone suitable for dry riprap is scarce and cement stabilized riprap placed as a slab is very vulnerable to damage and is a total loss once flood waters undermine it.

Stabilized sand is sacked—

loaded in the front-end loader—

and placed.

Sacked stabilized riprap is tramped into place.

Gilbert Bass, Senior Maintenance Foreman, checks the finished job.

Visiting Engineer

From Northern Rhodesia

For the engineers back home in South Africa, pictures of a Texas expressway were taken by Mr. and Mrs. Adrian Oloff Bergh of Lusaka, Northern Rhodesia. Under the sponsorship of the International Cooperation Administration, Civil Engineer Bergh spent five months completing an intinerary of study in the Texas Highway Department.

Nella Dieter, Information Clerk
Information and Statistics Division

Intent on bringing his country up to date in the labor of getting its roads out of the dust, a road engineer from one of today's frontier lands has spent the greater part of a nine-months tour in the United States watching Texans build roads.

The ingenuity and inventiveness evident everywhere the Texas Highway Department builds roads—particularly with relation to the mechanical devices used—have filled Adrian Oloff Bergh, a South African civil engineer, with hopeful ambition to bring his country's highway building system abreast of the times. In the words of the visitor, who is Executive Engineer in the Public Works Department of Northern Rhodesia, "The most marked difference between highway construction in my country and that in Texas is the approach as regards human labor. I have seen conservation of labor everywhere in Texas. New machines and devices do jobs once delegated to man. In Northern Rhodesia there exists the idea, 'Do it by hand.' This is a state of mind, and I hope my trip to Texas will influence a change."

Bergh, accompanied by his wife, recently spent five months in Texas and left late in August to visit the Colorado Highway Department and road equipment factories in Peoria and Chicago. He was sent to the United States by his government under the auspices of the International

Cooperation Administration to study road-building technique and design. He chose to spend the major portion of his time in Texas, visiting projects in the field in Districts 4, 7, 9, 10, and 18. In Austin he studied not only in the Materials and Tests Division but also in the Planning Survey and Highway Design Divisions.

It was in Tyler, Athens, and the surrounding Central East Texas country he found a counterpart to the road conditions of his homeland —"the same type of forest growth and sandy soil." A likeness to Northern Rhodesia road-laying conditions ended there, however. Nowhere in Texas did Engineer Bergh find the ant hills with which highway engineers must cope in his Central African country. Northern Rhodesia, he said, is known as a country of ants and ant hills. As many as seven of the insect establishments may be encountered in one mile; and while 300 cubic yards of dirt is the average size of a Rhodesian ant hill, Bergh said he has seen them as large as 2,000 cubic yards—enough dirt to fill five average size American houses. He described the ant hills as plastic clay which require the use of dynamite. "When we strike an ant hill, we must drill into it with an auger and pump 30 or 40 pounds of dynamite inside. After it has been blasted, the hill is in a loosened condition against which a bulldozer is then effective. All this slows down the process of our road building considerably," Bergh said.

Delightedly the foreign engineer told one example of how Texans put machines to use. He was visiting a job when a new mechanical chip spreader arrived. "It had been bought especially to complete a certain step in the construction of the highway; and before the contractor had it in his possession 24 hours, he had it altered to suit his requirements." Bergh's preoccupation with the road-building and road-maintenance machines he saw in use on Texas highways can be explained in realistic terms. He pictured his country as a thriving frontier land. After Canada and Australia, Northern Rhodesia is the main country to which the English are immigrating these days. It has been inhabited by white people in mentionable numbers only the past 50 years; however whites now total more than 80,000, and are pouring in. Lusaka, Bergh's home town, has doubled its population in the past five years. The pursuit of agriculture in the country is profitable, and mining industries are on the increase. There is a shortage of professional people — teachers, dentists, engineers, to mention a few fields — and the road engineer foresees that within a decade the highway work now largely performed by hand will have to be turned over to machines. Hand labor, he believes, is going to be very scarce and ineffectual in terms of the highway expansion and highway improvement which the increasing population will make necessary. He has observed that in Texas one mechanical chip spreader can surface eight miles of road in a day. In Northern Rhodesia 40 men would be used to do the spreading, and at the end of a day would have completed but one mile.

Before many of the progressive technical changes which Bergh has seen during his months in Texas can be introduced to his country, administrative and financial changes will have to be made. With no tax on gasoline and no road fund on a continuing basis, money for highways in Northern Rhodesia must come from governmental allocation entirely. At present the Public Works Department of the country, under which highway construction and maintenance operates, has twenty thousand miles of roads to maintain. Each year about 60 miles of existing road is improved. This work, Bergh explained, is asphalt surfacing of dusty roads which are in the primitive condition of Texas roads back in 1917 when the Texas Highway Department was organized.

Bergh cited the willingness of the professional engineer in the Texas Highway Department to accept change as the quality he believed had brought about the wonderful road system which foreign engineers travel to the Lone Star State to see. A graduate of the University of Witwatersrand in Johannesburg, he chose Texas for his highway research as a result of what he described as the almost legendary approval of the Texas Highway Department voiced by professional engineers from South Africa who have visited Texas in years past.

After watching the manufacture of the mechanical behemoths he hopes to see replacing manpower on the highways of Northern Rhodesia, the visiting civil engineer will complete his study of American highways in the Bureau of Public Roads at Washington. In late December he and Mrs. Bergh will sail for home.

During the past five years the Texas Highway Department has been host to 96 visiting engineers from foreign countries. As Adrian Bergh made his departure, two Bolivian engineers were just completing their research in the field where they—like Bergh—were primarily interested in highway maintenance and maintenance equipment. The visitors come to the United States under the sponsorship of the International Cooperation Administration and are routed to the Highway Department from the Washington office of the Bureau of Public Roads. R. J. Hank, Administrative Engineer for the Texas Highway Department, plans an itinerary of study for the engineers based upon their principal interest. Though some of the visitors come in large delegations of a dozen or more and stay only a few days, lone representatives who remain an average of three months are more typical.

Germany, with twenty-one engineers, France with seventeen, Brazil with twelve, and Bolivia with six, are the countries who have sent the greatest number of highway engineers to Texas in the past five-year period. Representatives from eighteen other countries have also taken the customary trips to watch actual work in the districts and have worked and made studies in the Austin division offices which best fill their specialized interest.

another improvement

Backed-up traffic, snarls, and tie-ups were once a common and almost constant occurrence at the Loop 12-U. S. 175 intersection in Dallas, and on Loop 12 back to Lake June Road.

Loop 12 had an eighteen-foot flexible base pavement with asphalt surfacing. This loop and U. S. 175 were carrying more than 10,000 vehicles per day. A traffic signal kept some semblance of order at the intersection of the two roads, but certainly was not the most satisfactory device for keeping traffic moving.

A street project completed a few months ago has changed this picture and greatly relieved the traffic con-

The flow of traffic on Loop 12 has been speeded up with the completion of this four-lane, divided section (looking south toward U. S. 175).

gestion and bottleneck which existed at the intersection and on the section of Loop 12. Construction was started in February 1956. From Lake June Road to U. S. 175, the old eighteen-foot pavement on the loop highway was replaced with two 32-foot concrete street sections, divided with a fifteen-foot median, with left-turn lanes at the major street crossings.

A diamond-type interchange was constructed at the intersection, carrying U. S. 175 over Loop 12 with twin structures providing for a 90-foot span in the center. This interchange fits into the over-all plan of eventually developing U. S. 175 as a freeway. It is now only a two-lane highway from the ends of the overpass approaches, but the divided grade separation section will also relieve one intersection until the freeway is built.

The project was completed in March at a total cost of $791,000, with the city contributing $192,000 as its share of construction costs for such items as storm sewers. The greater part of the 100 feet of right of way was secured by the city's annexing the area into the city limits. The right of way on U. S. 175 for the grade separation was widened from 120 feet to 300 feet.

A grade separation (bottom center) has ended the hazardous headache at the intersection of Loop 12 and U. S. 175.

Retirement Amendment Vote is November 5

What a Texas Highway Department employee must pay for steak and shoes and repairs to the roof over his head on the day he shakes the boss's hand and waves goodbye to the boys in work jeans or white collars—that will bring home to him the true worth of the monthly retirement check he'll receive after all the years he's been investing toward it.

Tuesday, November 5, state employees may use their voter's rights to try for assurance that the retirement benefits they someday will pluck from the mailbox will keep pace with whatever inflation the years have brought. On that day a Constitutional Amendment (HJR 37) which concerns them and their economic future will be first on the ballot they pencil in a referendum election. The vote they cast will represent the last step in a sequence of research, study, and legislative action which began at the annual meeting of the Texas Public Employees' Association in November, 1954. Employees at that meeting passed a resolution authorizing the Board of Trustees of the State Employees' Retirement System to request that the Texas Research League make a survey of the existing retirement program.

The Texas Research League, with Claude S. Holloway, CPA, named as project director, studied the pension plans of the 37 other states which maintain retirement systems for state employees, also surveyed the retirement plans of many large industries operating in Texas. Points of strength and weakness in the present state employees' retirement program came to light from these comparisons. A. A. Weinberg of Chicago, a nationally recognized authority on public employee pension plans, was retained by the Research League and comparative benefit levels were computed. The actuary also analyzed extensive statistical tabulations prepared by the Employees' Retirement System covering retirement, death, resignation, and disability experience under the present Texas program.

The improved retirement program finally arrived at was the cooperative effort of representatives chosen by the Texas Public Employees' Association, staff members and trustees of the Employees' Retirement System of Texas, state executives, and key legislators who joined with the Texas Research League. This revised system, set up under House Bill 790 and passed in the Fifty-fifth Session of the Legislature, follows closely, though not exactly, the recommendations made by the League in a report entitled, "An Improved Retirement System for Texas State Employees." The destiny of this bill hangs on whether or not Constitutional Amendment HJR 37 is passed by popular vote the first Tuesday in November.

If Constitutional Amendment HJR 37 passes, September 1, 1958, will be the beginning date for retirement advantages contained in House Bill 790. This will allow a period of time to work out necessary rules, to inform departments and employees, and to complete detail work for the changeover to the new system without confusion and misunderstanding.

One of the principal recommendations written into House Bill 790 stresses the need for a retirement system that will realistically meet the basic requirements of employees at the time of their retirement. Systems which base benefits exclusively upon past salaries often do not provide employees with sufficient income to permit retirement because of increased prices by the time retirement age is reached. Under the new proposal, retirement benefits will be a percentage of total average earnings from state employment in the best five consecutive years of the last ten years of employment. This takes into consideration not only inflation but the promotions that an employee may have attained while in state employment. Under the present law, benefits are related to past earnings, and these are limited to $3,600 per year for purposes of retirement benefits. Inflation has made the $3,600 limitation provided in the old system obsolete, and under the proposed plan this limitation has been eliminated. The new plan will help keep retirement benefits abreast of changes in the price level.

The proposed plan also provides higher retirement benefits for career government employees. For example, retirement benefits are ¾ per cent per year of final average salary for employees with only ten years service; with 20 years service, benefits are 1.25 per cent per year; with 30 years service, benefits are 1.50 per cent per year, and 1.75 per cent for all subsequent years. Social security benefits are, of course, in addition. This new method of calculating retirement benefits emphasizes the importance of career employees to the state, helps to create a stronger state service, and to reduce employee turnover.

A whole new area of benefits in the event of death or total and permanent disability in line of duty is offered in the proposed plan. Death of a state employee in line of duty would entitle his wife or dependent minor children to one full year's salary plus return of all past employee contributions to the fund. Total and permanent disability incurred in line

If Constitutional Amendment HJR 37 is passed in the statewide referendum election Tuesday, November 5, House Bill 790 will brighten financial prospects for state employees on retirement day. Watching Governor Price Daniel sign the bill are representatives from the Texas Public Employees' Association (left to right): Joseph N. Murphy Jr., Chairman, Retirement Committee; John W. McBrine, Board Member; J. M. Owens, of the Retirement Committee; W. P. Watts, Executive Director TPEA; Jack Burcham, of the Retirement Committee; Joe Pearce, of the Legislative Committee; Howard Arno, of the Retirement Committee; Don W. Cavness, Board Member; Luke E. Robinson, of the Retirement Committee; Kent Odom, of the Legislative Committee; Ed Veale, of the Legislative Committee; A. T. Mullins, Chairman, Legislative Committee; Curtis Adrian, of the Legislative Committee; H. Morris Stevens, of the Retirement Committee; and A. H. Christian, Board Member.

of duty would entitle the employee to monthly benefits equal to 60 per cent of his salary at the time of disability.

Also, after 20 years of state service, a state employee may select a retirement benefit plan under which his wife may receive a monthly annuity if he dies while still in active state service, according to the proposed plan. Heretofore this right was available only to employees with 30 years service.

A minimum benefit of $30 a month is assured any state employee who has stayed with the state long enough to retire under the terms of the proposed plan. The new law also provides that any employee will have his retirement figured on both the old and new systems for the next ten years and whichever is more favorable to the employee will be used. It assures that no benefits provided under the old law shall be taken away from him under the proposed Constitutional Amendment.

The actuary and the Research League were both of the opinion that the taxpayers of the state will not be required to pay more as a result of changing to the new system; in fact, they considered the change would be a gain to the State of Texas if more employees are encouraged by an attractive retirement program to make state employment a career. Each ten years of service with the state carries with it a bonus of benefits, graduating upward with the completion of the ten-year periods.

John B. Nations, Director, Equipment and Procurement Division of the Texas Highway Department and President of TPEA, in voicing the TPEA's endorsement of Constitutional Amendment HJR 37, urged that employees of the Highway Department, which is the largest state department, acquaint themselves with what he termed "this realistic retirement plan." "If all state employees will appoint themselves a committee of one and spread the message to friends and relatives, people will turn out to vote, even though this is not an election year," Nations said.

Awards

Highlight of the September 26 awards program was the presentation of the first 40-year award in the history of the Department. This award went to a woman—Miss Bessie Bergstrom of Accounting Division. (See separate story.)

A total of 83 Highway Department employees received awards which, combined, added up to 2,320 years.

No 35-year awards were made at this Commission Meeting, but in the 30-year category, 46 employees received awards. One of these 30-year awards went to State Highway Engineer D. C. Greer. Thirty-six awards were made for 25 years of service.

40-YEAR AWARD

D-11

Bessie V. Bergstrom, Senior Office Assistant

30-YEAR AWARDS

Administrative

Dewitt C. Greer, State Highway Engineer

D-9

Carl L. Boes, Senior Inspector

Albert H. Pollard, Supervising Field Engineer

District 2

Erskin R. Stephens, Construction Foreman

District 5

Marvin L. Brown, Skilled Laborer

District 6

Apolonio Munoz, Skilled Laborer

Manuel Ortega, Skilled Laborer

Jose C. Urias, Skilled Laborer

District 7

Joel W. Prosise, Skilled Laborer

District 8

Myrtle E. Boatright, District Bookkeeper

District 9

Temple F. Barr, Sign Supervisor

Thomas C. Collier, District Engineer

Frederick W. Cox, Skilled Laborer

Jim L. Hamilton, Senior Maintenance Foreman

Homer V. Southerland, Senior Maintenance Foreman

District 10

Willis R. Monroe, Senior Maintenance Foreman

Lonnie K. Taylor, Senior Shop Foreman

District 11

Allen H. Burnett, Skilled Laborer

Milledge A. Cox, Semi-Skilled Laborer

Lonnie R. Nail, Skilled Laborer

Tilmon W. Warr, Skilled Laborer

Robert O. Winkle, Semi-Skilled Laborer

Thomas I. Wright, Skilled Laborer

District 12

John F. Blair, Utilityman

Arthur H. Morgenroth, Skilled Laborer

District 13

Lawrence J. Hodde, Skilled Laborer

Oather E. Shafer, Skilled Laborer

District 14

Thomas F. Griffith, Senior Maintenance Foreman

District 15

McAfee D. Conover, Senior Maintenance Foreman

John K. Jones, Senior Maintenance Foreman

District 16

Robert E. Johnston, Senior Maintenance Superintendent

Thomas H. Puckett, Senior Maintenance Foreman

District 17

Berry C. Caldwell, Skilled Laborer

William D. Slatter, Skilled Laborer

Ona B. Tatum, Senior Office Assistant

District 18

Robert C. Blazer, Skilled Laborer

Johnnie B. Gentle, Skilled Laborer

Oscar L. Stewart, Senior Maintenance Foreman

Ernest L. Tackett, Skilled Laborer

District 20

Otis A. Keith, Senior Equipment Supervisor

District 22

George B. Brooke, Senior Maintenance Foreman

District 23

James I. Layman, Skilled Laborer

Porter McCarroll, Senior Maintenance Foreman

District 24

Charles T. Holmes, Senior Resident Engineer

Norman O. Miller, Senior Maintenance Foreman

District 25

James F. Nance, Skilled Laborer

25-YEAR AWARDS

D-11

George H. Pendergrass, Director, Accounting

D-18

B. J. Greer, Supervisor

Marion A. Smalley, Real Estate Assistant

District 2

Tom Frazier Jr., Senior Resident Engineer

Joe W. Harris, Senior Office Assistant

State Highway Engineer D. C. Greer accepts his 30-year award from Commission Chairman Marshall Formby. Members H. C. Petry and C. F. Hawn add their congratulations.

Receiving awards are, first row left to right, T. F. Barr, R. C. Blazer, C. L. Boes, G. B. Brooke, Myrtle E. Boatright, Bessie Bergstrom, Ona B. Tatum, T. C. Collier, A. H. Burnett, M. D. Conover, M. A. Cox, J. B. Gentle, and T. F. Griffith. On the second row are J. L. Hamilton, L. J. Hodde, C. T. Holmes, R. E. Johnston, J. K. Jones, O. A. Keith, J. I. Layman, N. O. Miller, W. R. Monroe, A. H. Morgenroth, and Apolonio Munoz. Third row: L. R. Nail, J. F. Nance, Manuel Ortega, A. H. Pollard, J. W. Prose, T. H. Puckett, O. A. Shafer, W. D. Slatter, Porter McCarroll, H. V. Southerland, and E. R. Stephens. Fourth row: O. L. Stewart, Willie Coleman, L. K. Taylor, Jose Urias, T. W. Warr, R. O. Winkle, T. I. Wright, C. B. Arnett, L. M. Barnett, A. A. Billo, W. R. Bridges, and A. C. Chamblee. Fifth row: J. E. Chandler, R. B. Dabney, T. F. Davis, L. B. Dean, Tom Frazier Jr., Neil Gibs, C. F. Gilliam, B. J. Greer, P. D. Henderson, J. C. Herrera, A. H. Hoot, and J. C. Vick. Sixth row: Herman Landrum, Robert McFarland, W. T. McKinney, H. V. Marchman, E. C. Mayo, H. L. Niemeier, E. H. Owen, George Pendergrass, C. J. Richter, H. H. Seele, M. A. Smalley, and G. J. Smith. On the back row are E. B. Walker and B. F. Sullivan.

District 3
- L. B. Dean, District Engineer
- Ewin H. Owen, Skilled Laborer

District 8
- Paul D. Henderson, Designing Engineer
- Herman Landrum, Chief Inspector
- George J. Smith, District Administrative Engineer

District 9
- Heschel V. Marchman, Senior Accountant
- Jesse C. Vick, Skilled Laborer

District 10
- Willie R. Bridges, Chief Inspector
- James E. Chandler, Chief Inspector

District 11
- Ray B. Dabney, Semi-Skilled Laborer
- Loyd B. Smith, Skilled Laborer
- Ernest B. Walker, Senior Party Chief

District 12
- Arthur H. Hoot, Construction Foreman
- William T. McKinney, Tunnel Superintendent

District 13
- Alfons A. Billo, Semi-Skilled Laborer
- Charlie J. Richter, Semi-Skilled Laborer

District 14
- Neil Gibbs, Senior Maintenance Foreman

District 15
- Hermann H. Seele, Senior Designing Engineer

District 16
- Lee M. Barnett, Senior Maintenance Foreman
- Robert McFarland, Senior Maintenance Foreman

District 17
- Theodore F. Davis, Senior Maintenance Foreman

District 18
- Clinton F. Gilliam, Chief Inspector
- Robert L. Lawrence Jr., Senior Maintenance Foreman

District 19
- Attison C. Chamblee, Skilled Laborer
- Willie Coleman, Construction Foreman

District 20
- Bernard F. Sullivan, Chief Inspector

District 21
- John C. Herrera, Senior Resident Engineer

District 23
- Erle C. Mayo Sr., Senior Resident Engineer

District 24
- Clyde B. Arnett, Skilled Laborer
- Harry H. Corbett, Senior Resident Engineer
- Herbert L. Niemeier, Chief District Accountant

40 Years

The young girl walking through the doors of the State Capitol to apply for her first job kept in mind the special instructions her business college had given her for finding the place. She was to report to an office located in the corridor behind the House of Representatives, and she was to use the back stairs. The year was 1917. The girl was Miss Bessie Bergstrom, whom the hand of chance was escorting to the first offices of the Texas Highway Department. She, and everyone going to the highway offices at that particular time, avoided the front stairs of the Capitol. Such a route would have taken them to the entrance doors of the House of Representatives where they would have been stopped. Those serious days the Legislature was in special session considering no less a question than the impeachment of the governor.

That August in 1917 Miss Bergstrom was hired to type license fee records for the Texas Highway Department, then only two months old. She has been with the Department from its first 194,720 licensed vehicles to the present 4,220,147 registrations. On August 13, 1957, she attained the distinction of becoming the first employee in the Texas Highway Department eligible for a 40-year award. The record of continuous service she has set could extend on to establish yet another mark—a 45-year award—the Personnel Division has observed, for Miss Bergstrom plans to continue work in the Accounting Division, where she holds the title of Senior Office Assistant.

From 1917 when she began work as a typist earning $60 per month, Miss Bergstrom has received salary promotions which now rank her among the highest paid women in the Texas Highway Department. Look in on her at work these days and you will find her at the job of auditing the deposits of money coming in to the Department daily from all over the state.

Miss Bergstrom's time with the Highway Department has been spent entirely in Austin. She can recall not only the days of walking up the back stairs in the Capitol Building but also those years all the Austin offices of the Department could fit into the second floor of the State Office Building (now the Land Office Building). When asked the most marked change the years have made in the Department, it is not increase in numbers of employees but the evolution of the work week from six days to the present five-day week which she mentioned immediately. She did turn back in memory to observe that in 1922 there were only about 25 women employed in the Austin office. On August 13—Miss Bergstrom's 40-year anniversary with the Department—the Personnel Division estimated an approximate payroll total of 500 powdered noses. She has seen acceptable appearance for the business woman change from ankle-length skirts, long sleeves, high necklines, and long hair. And she has witnessed Department acceptance that smoking on the job is a habit in which workers of both sexes will persist. She remembers when time off for Christmas began at 3 p.m. Christmas Eve, was snapped short at 8 a.m. December 27.

Armistice Day, November 11, 1918, is connected with the Department in her recollections, and a small American flag she bought that day is among her keepsakes. That historic day was a workday, but all regard for routine was legitimately thrown aside after Department executives announced that all who wished might join in the parade which was gaining momentum down on Congress Avenue. Highway Department celebrators fell in step, each waving a flag to add to the spectacle of red, white, and blue as the merging crowd made its way jubilantly up and down the Avenue.

In 1929 Miss Bergstrom was named Chief Clerk of the Registration Division. Prior to that time she had been secretary and assistant chief clerk. A silver pin and certificate of award from the American Association of State Highway Officials was given her as Chief Clerk of the Registration Division in 1946 in recognition of 25 years' "meritorious public service."

The daughter of the late Carl Bergstrom, who immigrated to Texas from Småland, Sweden, and Hilma Sjoberg Bergstrom of Austin, Bessie was reared in Decker Community, a farming area near Austin. Miss Hazel Bergstrom, a sister, also works in the Accounting Division of the Department, and in April, 1956, received a 30-year award. Bergstrom Air Force Base near Austin is named to honor their cousin, Captain J. A. Earl Bergstrom, Austin's first casualty in World War II.

Although cooking is the at-home hobby she most enjoys, it is the traveling she has done during her vacations that has inspired Miss Bergstrom to think in terms of a day when she will stop setting duration records as an employee of the Texas Highway Department. When that time comes, she hopes to emulate the retired people one sees pictured in the magazines and stretch out on a deck chair of a boat heading her toward a vacation in Europe and her father's birthplace.

Bridge Raising on U.S. 67

Lawrence J. Marple, Resident Engineer
District 19

The Texarkana Dam, built by the Corps of Engineers on Sulphur River, created a large reservoir area. U. S. 67 crosses the fringe of this reservoir area at five locations, necessitating raising the highway at each location.

Described in this article is the construction at a location nine miles west of Texarkana. Construction consisted of building up the roadbed and raising two bridges, one at Elliott Creek and one at Nettles Creek.

The contract was awarded to McMillin-Burkett Construction Company, with Charles Cohen subcontractor on the concrete work and bridge raising.

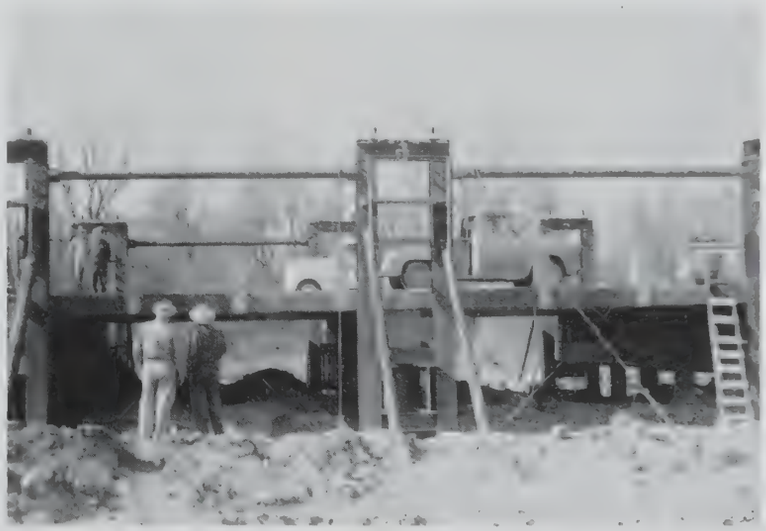
The Elliott Creek bridge consisted of three 50-foot continuous units with 44-foot roadway on a 4 per cent grade. It was raised a maximum of eight feet and extended with a twenty-foot span on each end.

The Nettles Creek bridge consisted of two 50-foot and one 80-foot continuous units, with a 44-foot roadway. It was raised a maximum of 10.9 feet and extended with a twenty-foot span on each end. The 80-foot unit, being critical, was used as the design criterion.

A screw-jack unit, resting on five timber foundation piling in two bents of three and two piling each driven to 30-ton bearing, was designed.

The design anticipated that each

Elliott Creek bridge prior to raising. Railing is removed and founation piling for screw jack units is shown on the bridge



Jack towers are in place but work has not begun on breaking piling. Discussing bracing are Guy Gullion, Senior Resident Engineer, and Charles Cohen, subcontractor, right.

Blocking under the expansion end of the slab.

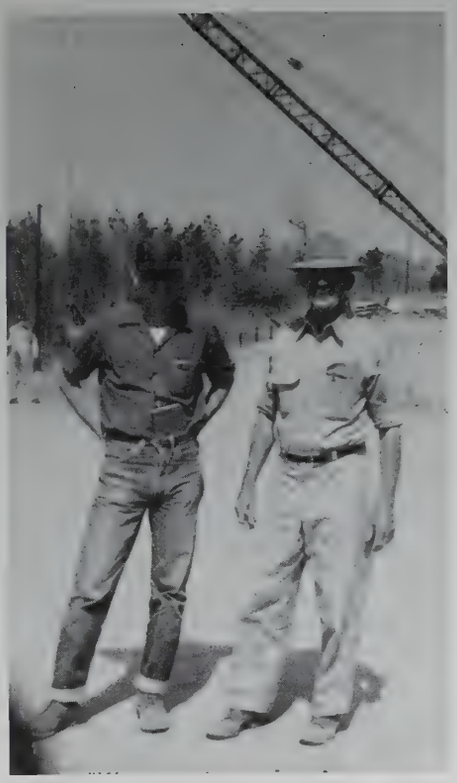
Gears for the screw jack unit. The slab unit is nearing final posion, as evidenced by amount of power screw extending through lifting nut.

Cribbing and 100-ton jack under the center of the interior cap.

Jacking operation in progress. In the right foreground is the one ringer keeping cadence.

On this three-level operation the unit in the background is at grade, the center unit is at intermediate level, and the unit in the foreground is at original level.

The end unit is in position, with piling extensions poured and framed timber bent supporting expansion end.



Lawrence J. Marple, Resident Engineer (right), and Charles Thompson, Senior Inspector (left), were state inspectors on the bridge raising.

jack unit could be operated manually. However, after jacking operations began it was readily apparent that this was not feasible inasmuch as two large men could barely operate each unit, and manual operation was completely abandoned as far as actual raising of the units. Soon after jacking operations started, teeth began to shear off a bevel gear which meshed with the pinion gear on which the lifting force was applied. The remedy to this was a system of hydraulic jacks to do the actual lifting, with the screw jacks going up in conjunction to hold the slab unit in position when additional cribbing had to be added under the hydraulic jacks. Accordingly, three hydraulic jacks were used under each cap, 50-ton jacks at each end, with a 100-ton jack at the center. Using this method the only further trouble which developed was the bursting of a gasket, or failure of a rubber cap when the jacks progressed out of unison; however, this was held to a minimum by having one man ring a gong which was the signal for each jack operator to make a stroke on his jack.

If a slab began to slip out of alignment it was brought back in line by regulating the rate of vertical displacement of the slab, depending on the direction desired. When brought to final grade, all units were very close to original alignment, both longitudinally and transversely.

The sixteen-inch square concrete piling were extended with 24-inch round concrete columns, with an overlap of three inches. This allowed only four inches between the metal column forms and the existing piling in which to pour concrete. Concrete for the outside columns was placed by means of two reverse inclined chutes. To pour the interior columns, a bottom dump bucket traveling on a cable looped around the slab was used.

Pictures shown are a pictorial representation of methods and equipment used.

Guides in Selection of Freeway Interchanges

P. R. Tutt, Senior Designing Engineer
Highway Design Division

The crossing of two freeway-type facilities inevitably involves an extensive conglomeration of roads and bridges which to the inexperienced person looks like a completely unintelligible mass of loops and ramps. A closer look at a typical intersection such as the one shown in Figure 1 will show, however, that a driver entering such an intersection uses only a small part of the facilities provided and has only two points at which he has a choice of more than one possible path. At point A he must decide whether or not he wants to continue ahead on the road he is on or turn off to the intersecting road. If he elects to go ahead, he has no more decisions because there are no more possible turns for him to make. If he elects to turn off at point A, he then has a choice at point B of whether to go to the right or to the left. Either way he has no additional choices beyond point B. These two decisions

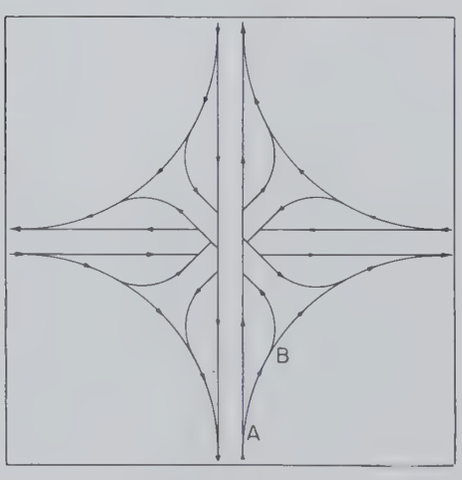


Figure 1

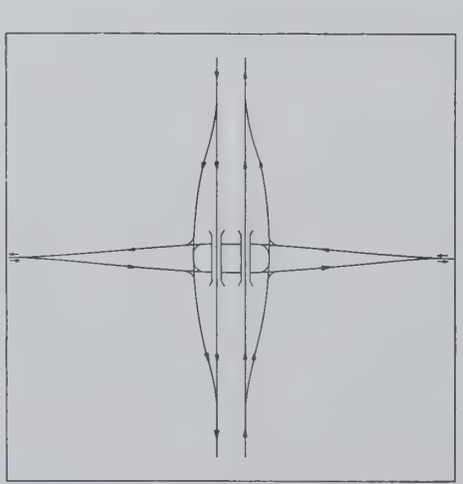


Figure 2

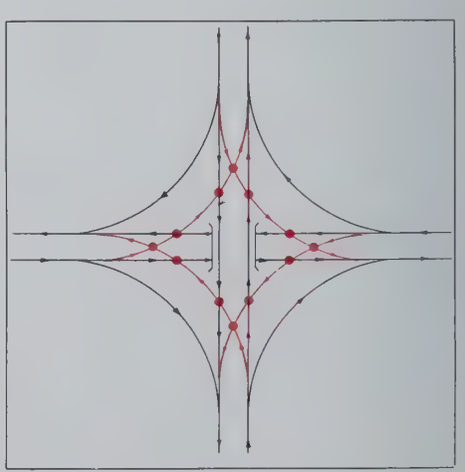


Figure 3

are relatively simple if the points are properly signed, and the intersection should not be much of a problem for the driver. This general arrangement is true of nearly all properly and adequately signed intersections.

In determining what design to use at any particular location the designer must base his decision on the demands of the traffic to be served. Volume is of prime importance but speed and general characteristics must also be considered. General characteristics include such things as the per cent of trucks, per cent of repeat drivers, and the type of facility which traffic has become accustomed to before approaching this particular intersection.

One of the most common types of intersection used in freeway design is the ramp or diamond, as shown in Figure 2. It is used primarily at locations where a freeway crosses a lesser facility, and will not be dealt with extensively in this article. The procedure suggested here for determining the adequacy of a design can be applied to a ramp-type design, however.

Several basic features enter into the selection of the design for a freeway intersection. These features or component parts, each of which has definite characteristics of its own, can be combined in properly assembled groups to make up the intersection. These parts are such things as lanes, roadways, loops, bridges, and weaving sections. The capacities of such parts as loops and weaving sections are likely to be the features which control the design. The capacity of a bridge is variable since it is possible to make the bridge as wide and as long as necessary to span and carry the required number of lanes. If no traffic desired to turn from one road to another, the bridge in itself would be all the intersection needed. This is an important point because there are a few instances where turns form a very small part of the traffic volume or where they can be forced to turn at another location.

When turns constitute a considerable part of the traffic volume, as is usually the case, a more elaborate arrangement is needed. Right turns, since they do not conflict with other traffic movements, are not usually a problem. The only requirement for right turns, as shown in black in Figure 3, is that the capacity of the lane or lanes and of the facility going away from the intersection be great enough to absorb the combined turning and through movement. Each left turn, shown in red on Figure 3, conflicts with four other movements. The volume of these left turns and the means used to eliminate conflicts caused by them determine the type of intersection facility.

Four-Approach Intersections

For four-approach intersections there are several basic designs plus many variations which can be used. Any of these can accommodate as many straight-through and right-turning vehicles as it is practical to provide lanes for. Their ability to handle left-turning movements varies.

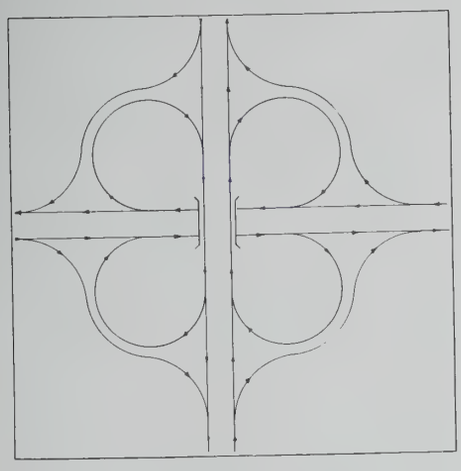


Figure 4

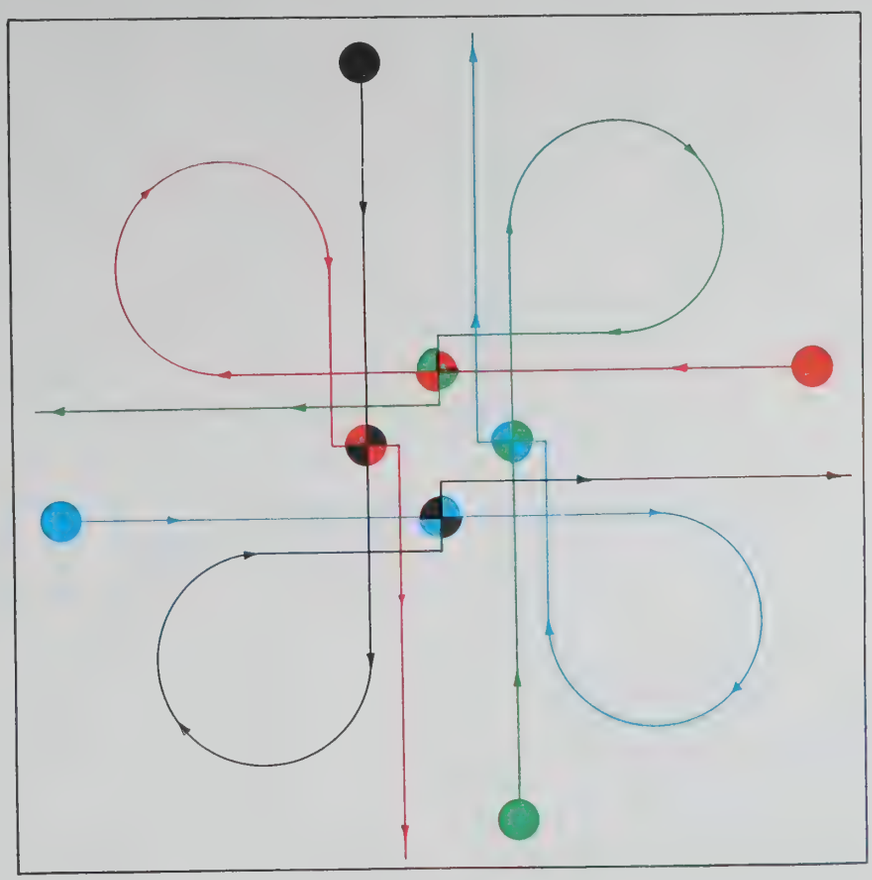


Figure 5

Figure 4 is a line diagram of a simple cloverleaf-type intersection. This represents the lower limit of left turn capacity for free-flowing intersections. The capacity of the through movements and the right turns can be varied by adding or subtracting lanes, but the left-turn capacity is limited by two factors.

(1) The volume of each individual left turn is limited to the capacity of the loop which it must traverse. The capacity of a loop is usually considered to be limited to one lane because the geometrics of the loop are such that drivers tend to form a single line regardless of width and, of course, speeds are definitely limited. *The Policy on Geometric Design of Rural Highways,* published by the American Association of State Highway Officials in 1954 in Table II-16, Page 98, and Table VII-3, Page 263, can be used as a guide in determining what size loop should be used and what its approximate capacity will be. The general consensus of opinion among engineers, however, is that loops designed for more than about 30 or 35 mph are not practical because of the increased travel time brought about by the larger radii needed for higher design speeds.

(2) Since each left turn movement must weave individually through both of the left turns entering at right angles to it, as illustrated in Figure 5, the combination of the two movements must not be greater than can accomplish this weaving maneuver. The weaving capacity can be determined approximately from Table VIII-3, Page 357, of the *Policy on Geometric Design of Rural Highways,* mentioned previously. The weaving vehicles will be equal to the combined left turns per hour for any two adjacent approaches. If either of these two limiting conditions is exceeded, it will be necessary to alter the design. If the capacity of a loop is exceeded, it will be necessary to provide for that particular movement in some other manner. Figure 6 shows two possibilities for this. In this instance the volume of cars wishing to use the loop labeled LT-A is

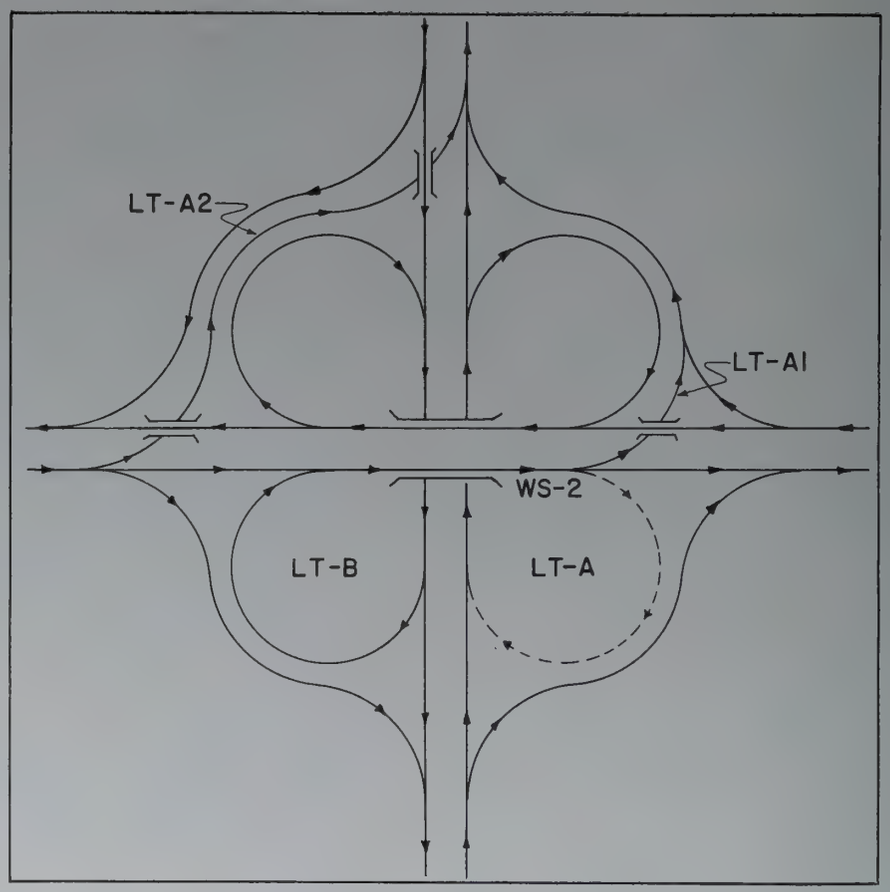


Figure 6

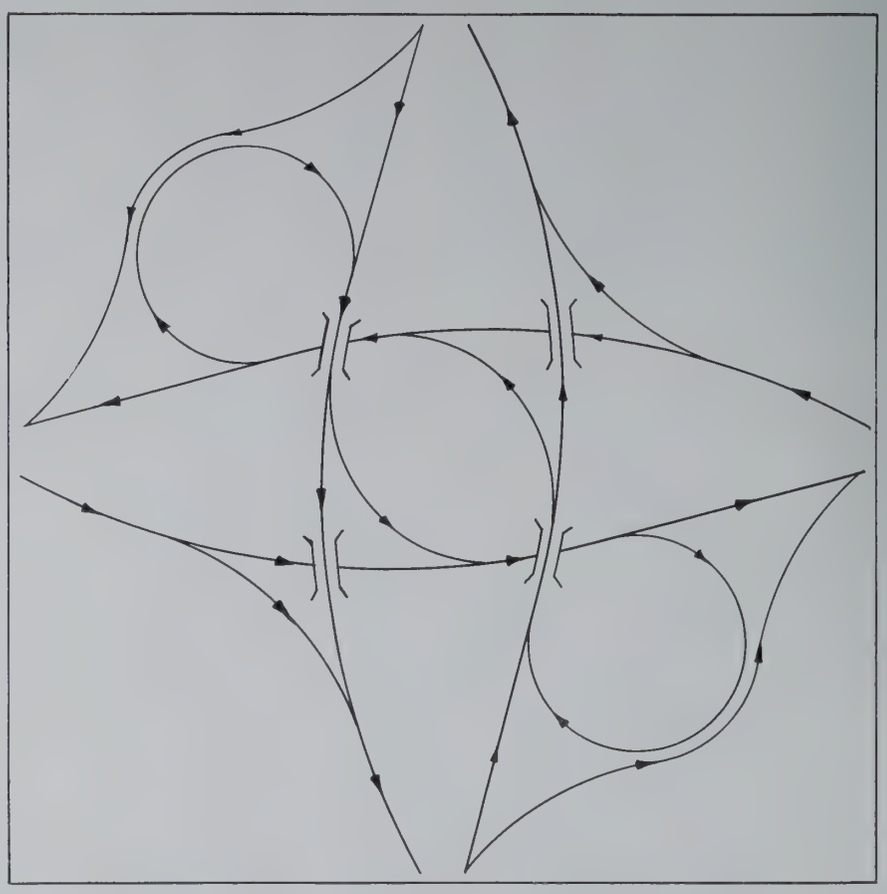


Figure 7

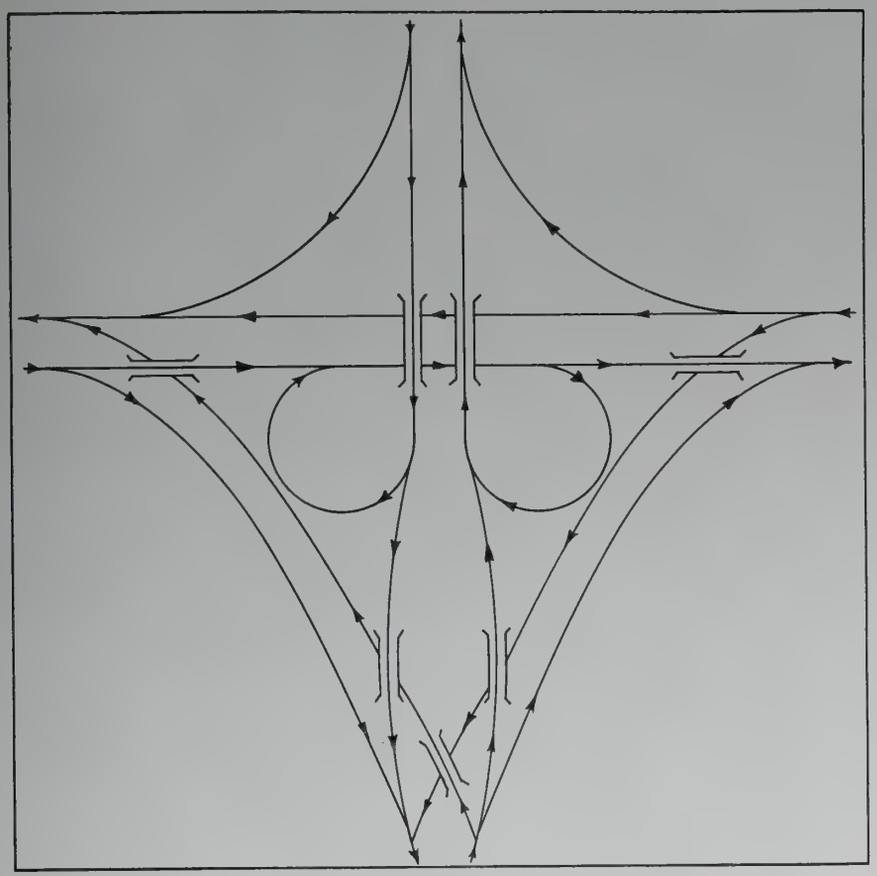


Figure 8

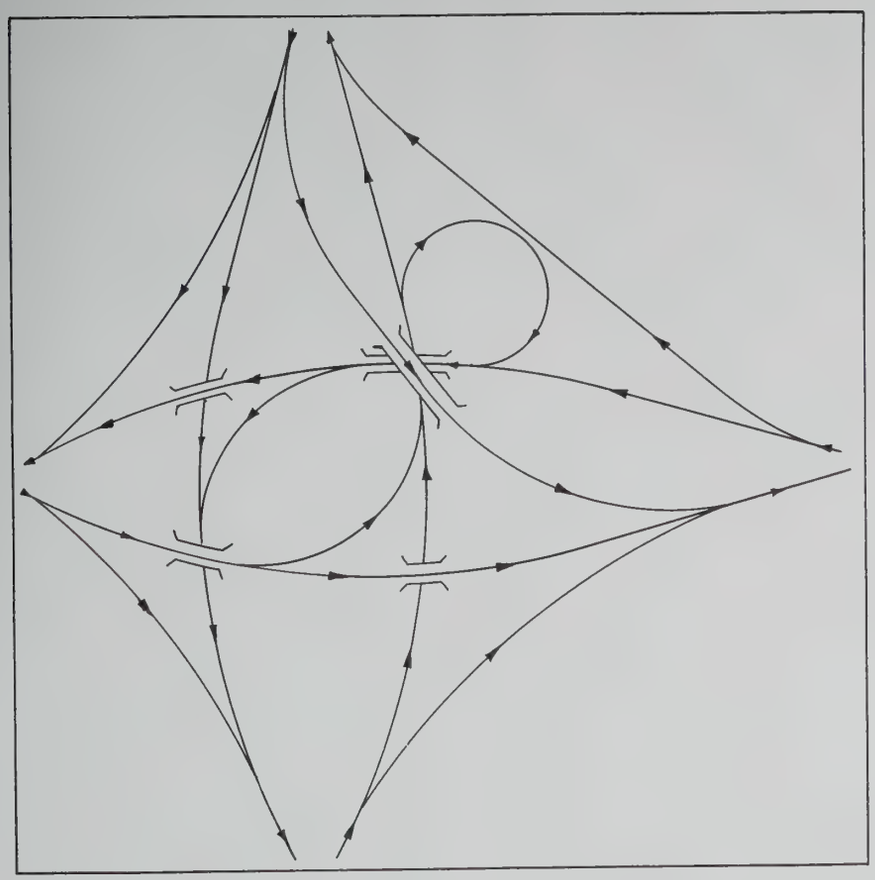


Figure 9

greater than the capacity of the loop. This movement can be then handled as shown by LT-A1 or LT-A2. Either of these treatments improves the capacity, but LT-A2 provides more direct alignment.

If LT-A did not exceed the capacity of the loop, but rather the combination of LT-A and LT-B, which must weave through each other in the area indicated as WS-2, exceeds the capacity of the weaving section, the solution might be the same as suggested when the capacity of the loop was not great enough to accommodate LT-A. By moving LT-A to LT-A1 or LT-A2 the weaving section is eliminated completely. In this case the treatment could be applied to either LT-A or LT-B since removing either of these from WS-2 eliminates weaving. The treatment would usually be used on the heavier left-turn movement, but might be dependent on topography or other consideration.

In various cases the capacities of any or all loops and weaving sections may be exceeded, requiring special treatment for the movements involved. Several examples are shown in Figures, 7, 8, and 9. These are some of the intermediate steps between the cloverleaf which provides the least facility for left turns—and the full direct interchange, which provides a direct connection for each left-turning movement. The capacity of these direct connections is limited only by alignment and number of lanes of the connection and by the capacity of the merging operation which must occur as the direct turn enters the through movement. There are two basic types of direct interchanges (illustrated in Figures 10 and 11). Figure 10 shows a four-level interchange with each pair of opposing left turns carried on a separate intermediate level. It has the disadvantage of requiring a 60-foot difference in elevation between the top and bottom levels, which often results in either very long or very steep grades. It has the added disadvantage that alignment of the left-turn movements is not as good as might be desired, but has the advantage that the

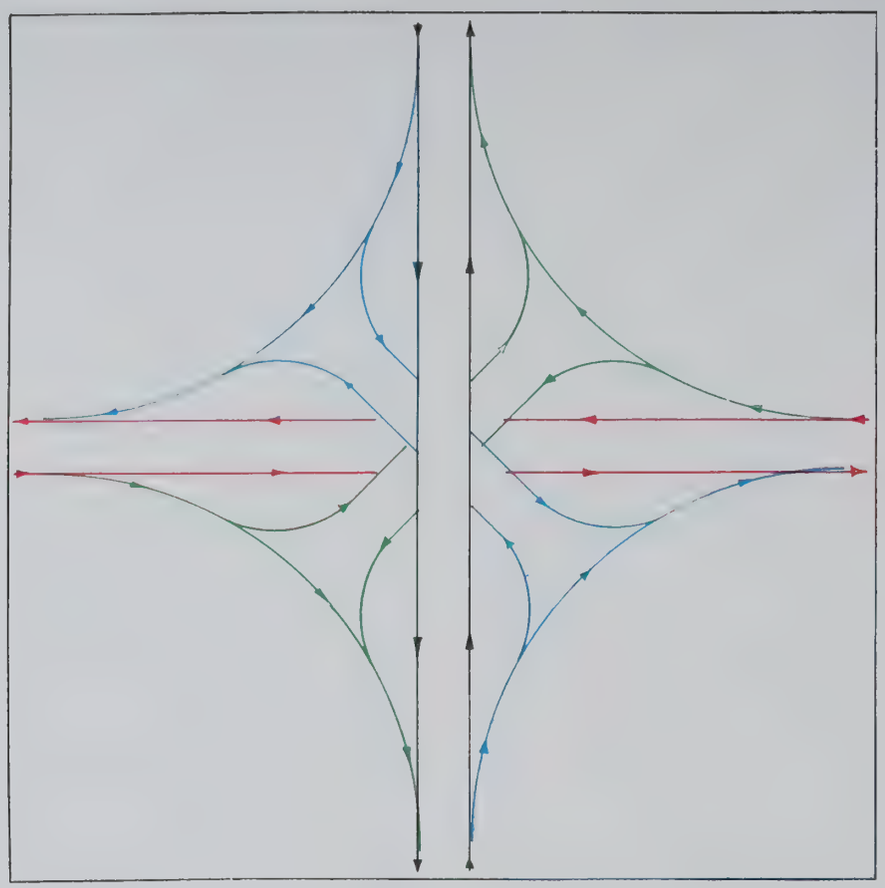


Figure 10

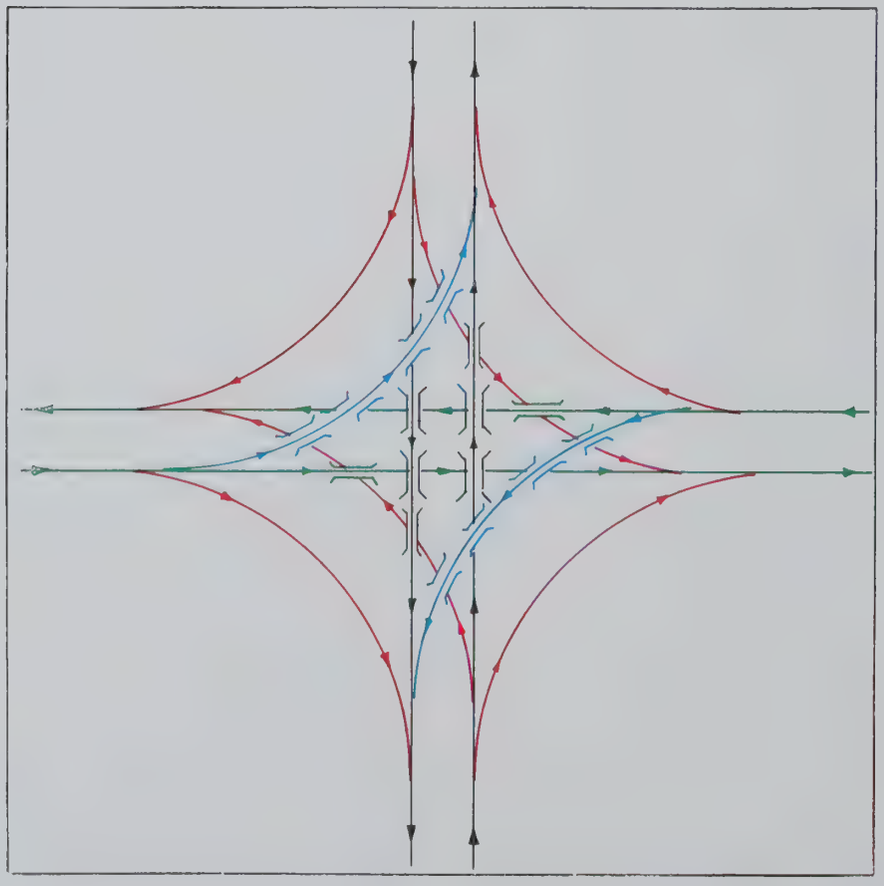


Figure 11

turns merge into the through lanes from the right and into the slower right lane. Figure 11 shows the same general objective accomplished by spreading the conflicts out over a larger area and providing a number of bridges rather than the concentration shown in Figure 10. This design does not have the extreme differences in elevation required for the Figure 10 design, and the left turns are more direct, allowing better alignment and resulting in higher operating speeds. The left turns merge into the through lanes from the left, which is less desirable than if they could be brought in from the right. The designs as shown usually assume level terrain. It is often possible to use terrain advantageously, in which case it might be desirable to change some of the relative elevations.

Three-Approach Intersections

The number of possibilities for three-approach intersections is less than for four and the approaching driver has only one point at which he must choose between two possible routes. Figure 12 shows the movements for a three-approach location diagrammatically with the three points of conflict indicated.

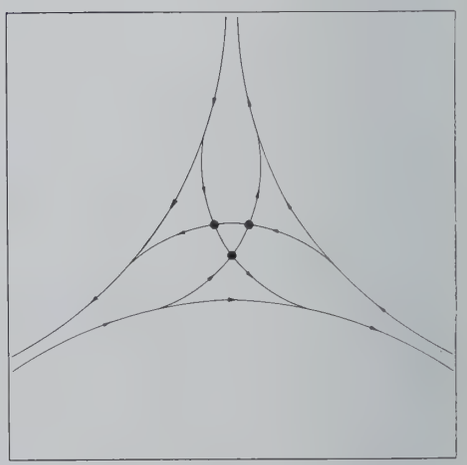


Figure 12

These three points can be dealt with in several ways, two of which are shown in Figures 13 and 14. Figure 13, which might be used where one of the left turns is very low in volume, accomplishes the turn from A to C by weaving it across the C-B movement, turning it on a short radius, and weaving it across the B-A movement. This limits the capacity of the whole intersection by involving most of the movements in weaving. Figure 14 uses a cloverleaf-type treatment, which eliminates the weaving section. Here, the limiting factor is the loop itself. Either of these types, while having their limiting features, serves very well when used at locations where they are suited to the volumes. The capacities must be determined by component parts and based on the AASHO policy tables mentioned previously.

The direct interchange for a three-approach location may take the form of a three-level interchange, shown in Figure 15, or may have the bridges decentralized, as shown in Figure 16. The capacity of these types would be limited only by the number of lanes provided and could be increased by increasing the number of lanes.

In addition to using these criteria, the selection of the type of intersection for a given location requires considerable judgment. The first step is to obtain the traffic volumes. The DHV or thirtieth highest hour for 1975 should be used and can be obtained from the Planning Survey Division. These should be broken down by Planning Survey to show each turning movement separately.

Inspection of the figures should make it possible to select a tentative design. The DHV traffic should then be put on the selected design and broken down completely by component parts as shown in Figure 17. Each of these parts should then be checked against the AASHO policy tables. In any instance where the 1975 DHV exceeds the capacity, the design should be altered to provide the needed capacity. It should be kept in mind that this procedure will usually result in the selection of the minimum facility which will handle the traffic. There will be many cases where it will be possible and desirable on the basis of speed and general characteristics of traffic to provide a higher-type facility than the volume actually demands. It should also be remembered that the sections of freeway between interchanges must usually function as weaving sections

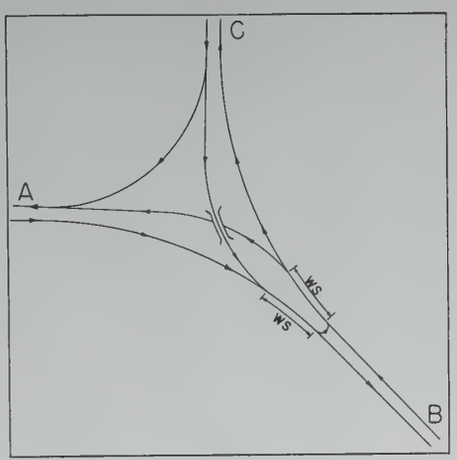


Figure 13

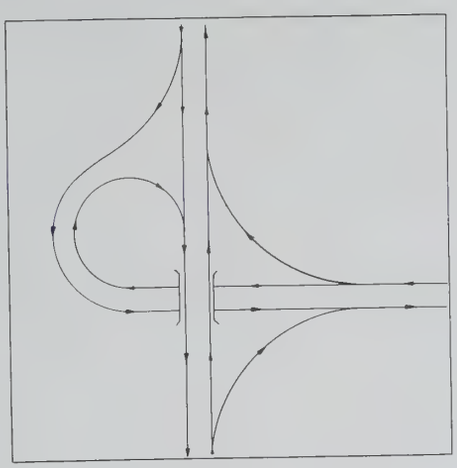


Figure 14

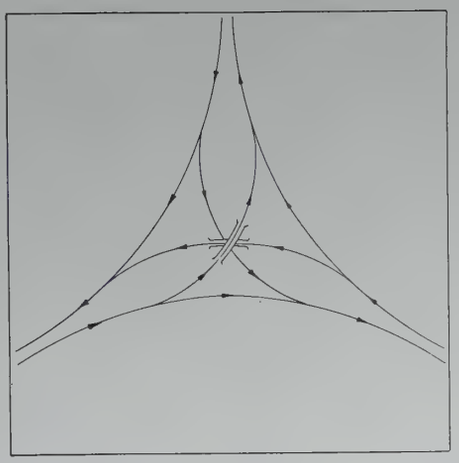


Figure 15

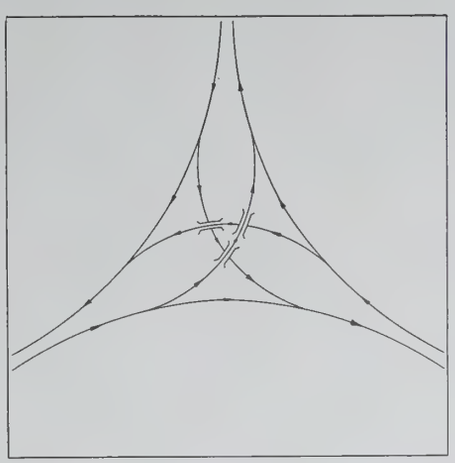


Figure 16

and should be considered as such in the design. It may, in cases where intersections fall closer together than would allow sufficient weaving distance, be necessary to keep some of the movements separate and provide two roadways in each direction between the interchanges.

Publications which will aid the engineer in the selection and design of interchanges are:

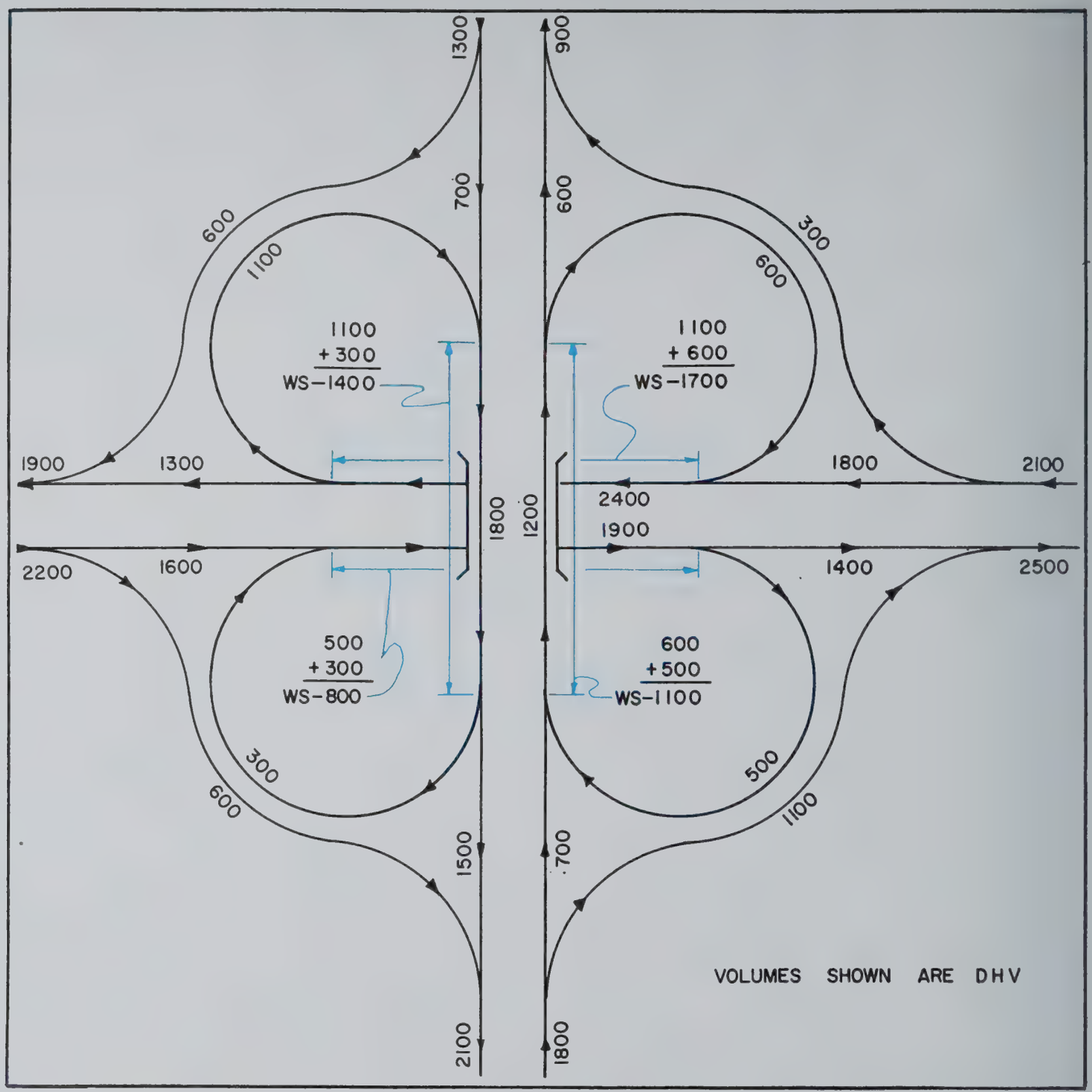


Figure 17

1. American Assn. of State Highway Officials. *A Policy on Arterial Highways in Urban Areas.* Chapter J—Interchanges, July, 1956.
2. American Association of State Highway Officials. *A Policy on Geometric Design of Rural Highways,* 1954.
3. Institute of Traffic Engineers and Association of Casualty and Surety Companies. *Traffic Engineers Handbook,* 1950.

OVER THE HIGHWAYS

Comments . . . from the Traveling Public

● . . At this time I want to thank you for the fine work your local crew is doing for the Post Office Department.

Their work in repairing and maintaining the mail boxes along the highways and farm-to-market roads is most commendable. The boxes are kept in neat appearance, are kept in better condition than many of the patrons would maintain them and are mounted for best service to the patrons.

Please let me humbly thank you for your cooperation with the Post Office Department and to again express my admiration for the Texas Highway Department, truly one of the finest of our departments of state government.

William M. Petmecky
Acting Postmaster
Fredericksburg, Texas

● . . I have just returned from an automobile trip to Kerrville, via San Antonio, with side trips to Bandera and other towns. This meant traveling on farm roads as well as state and federal highways. The roads were uniformly excellent and well marked. I think you and your entire department are to be congratulated.

Mrs. Leila O. Cutshaw
Lafayette, Louisiana

For Once We Weren't Guilty!

● . . I made a trip on Highway 180 from Hobbs, New Mexico, on Saturday, July 13, of this year. It had been freshly oiled with some kind of a yellow viscous oil which was very difficult to remove, resulting in impaired finish. Am enclosing bill. Would appreciate hearing from you.

(Signed)

◈ This situation was caused by a privately owned truck hauling oil over U. S. Highway 180 west of Seminole. The driver left the valve on a tank open and spread the oil along the highway. This situation was corrected as soon as possible by spreading sand on the pavement and blotting up oil.

S. C. McCarty
District Engineer
Lubbock, Texas

● . . The drive out through the Palo Duro Canyon was such a beautiful drive and we all appreciate the perfection of the road so much that I am impelled to thank you for the excellence of the work. Why should anyone leave Texas to seek lovely scenery or first-class roads? Thank you and your force for the exquisite pleasure you gave us.

Miss M. Moss Richardson
Canyon, Texas

Well, Maybe One or Two . . .

● I don't know if you have ever received a letter of appreciation before, but you are getting one now. I had occasion to travel across Texas last month, and I certainly enjoyed the hospitality of Texas as represented by your marvelous roadside parks. I have never seen such nice ones, and so well kept up. Knowing the traveling public as I do, I know how hard it is to keep these parks clean. I also admire the well-mowed rights of way, and the trees along the the road.

I like my own state, but we are way behind Texas in the matter of highways and roadside parks.

W. P. Johnston
El Dorado, Arkansas

● . . A week ago my family and I were in Orange and had occasion to stop by your office for information, both locally and to get the best routing to Dallas.

May we take this opportunity to express our appreciation for the courtesies shown us by the young lady in your office. She not only got us to our destination in Orange but routed us home over one of the most beautiful drives we have seen in Texas.

F. M. Ford
Grand Prairie, Texas

To and From Our Readers

We on the staff of TEXAS HIGHWAYS enjoy getting letters concerning articles printed in the magazine. It means the articles are being read, and are of enough interest to stir up comment. If you have anything to say, write us and let us publish your letter, or excerpts—whether it challenges something contained in an article, or verifies it.

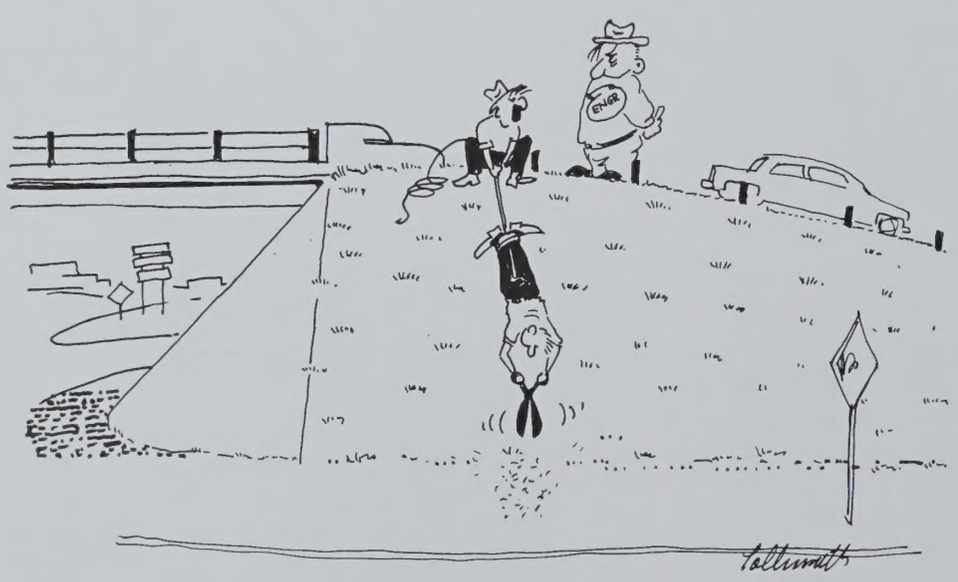
In the July issue, Mr. Royster of the Bureau of Public Roads wrote concerning Gordon Dabney's article on Bolivian roads. This month, we carry Mr. Dabney's reply to Mr. Royster.

● . . It was not my intention to indicate that our work in Bolivia was the first highway technical assistance given by the United States to foreign countries. The U. S. has given financial and technical assistance to many countries during many years. This work has been administered by the Bureau of Public Roads, International Cooperation Administration, and other organizations.

However, in my article I used the Spanish word *servicio* to designate a special type of organization well known throughout Latin America for administering U. S. technical assistance in the fields of public health, education, and agriculture. However, our organization is the first of this type organization to be set up for highway technical assistance anywhere in the world.

I wish to express my appreciation to the personnel of the Texas Highway Department for the kind treatment and hospitality you have given to the Bolivian engineers who have trained with the Department. Your hospitality has meant much to them.

Gordon W. Dabney
Director, SCBAC



"These two-to-one slopes are giving us a few mowing problems!"

About the Cover . . .

Puffing down Buffalo Bayou, a tug pushes a loaded barge under the graceful twin structures that carry Houston's U.S. 90-A and Sixty-ninth Street traffic across the stream, creating a striking contrast between the functional, yet beautiful, and the strictly utilitarian.

Since the bridges were chosen Class II winners, we felt that more information should be given concerning them than could be included in About the Cover, so the winning picture and more details can be found on the inside front cover.

Photograph by Doug Fairchild.

TEXAS HIGHWAY COMMISSION

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TEXAS HIGHWAYS, official journal of the Texas Highway Department, is published in the interest of highway development in Texas and for departmental education in the improvement of construction, maintenance, and operation.

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Texas Highways

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GLORIA SHARAF	Editor
BOB McCARTY	Art Director

DO YOU KNOW TEXAS?

Gordon K. Shearer
State Parks Board

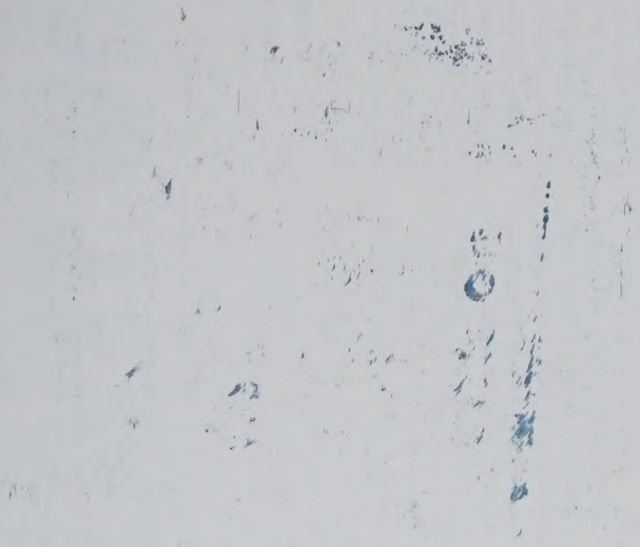
Air conditioning and a paved road in a desert are just more of those true items that make the outside world doubt what it hears of Texas. Doubters can be convinced by turning north off U. S. 80 about five miles east of Monahans. The paved road crosses the Texas and Pacific Railway tracks and goes into the heart of the Monahans Sandhills, a windblown desert expanse that stretches into New Mexico.

The air conditioning is in a modern masonry, steel, and glass building that has its ends resting on sand dunes while it spans a depression between them. It is the administration and museum building for the newest Texas State Park.

Preservation of the area was suggested an even ten years before its accomplishment this year. In a Doubleday & Company, Inc., publication in 1947—"Adventures With a Texas Naturalist"—author Roy Bedichek wrote:

"I venture the statement, without research, that in no other forested section, Amazon valley not excepted, is there to be found a higher proportion of fruit to wood than in this Lilliputian jungle in the northern part of Ward County. Vegetatively considered, it is as much a natural curiosity as the Painted Desert or the wonder-areas of Yellowstone. This hummocky expanse of stunted growths, or an ample sample of it, should be reserved and protected as a state or national park."

Early to make use of the Monahans Sandhills were marauding Indians and perhaps a few of the badmen of the day. Its shifting sands left no trail for pursuers to follow them. Under its sand, by digging a few feet, they could find water—potable if not palatable. Seemingly bare, the desert had growths to sustain both human and animal life indefinitely. Archaeologist Charles Steen of the National Park Service says that in prehistoric times the area was a place of small lakes and tall grasses. Elephants were hunted there by men whose weapons were fluted dart points.

Tawny sands, more kindly to the eyes than the glaring white of caliche farther to the west, are carried by the wind, drifting into dunes 40 to 60 feet high with crests like breaking waves. Children and adults delight to climb the dunes and slide down like coasters on snow.

Six mile-square sections are included in the park. Much of it can be seen from an abandoned oil well derrick, hauled to the site and converted into an observation tower. Artificial shade for picnickers is provided by movable shelters at a location from which some of the highest dunes are visible.